

## CURRICULUM VITAE

**Steven K. Chan**

Contact	Jet Propulsion Laboratory California Institute of Technology 4800 Oak Grove Drive, MS 300-362A Pasadena, CA 91109, USA.	Tel: (818) 354-7320 Fax: (818) 354-1178 Email: steven.k.chan@jpl.nasa.gov <a href="http://science.jpl.nasa.gov/people/Chan/">http://science.jpl.nasa.gov/people/Chan/</a>
Research Interests	Retrieval methods for microwave remote sensing of soil moisture and vegetation parameters Resolution enhancement techniques for satellite datasets Long-term trend and variability of land hydrological processes End-to-end simulator software development for earth science flight projects	
Education	<b>University of Washington</b> , Seattle, Washington, USA. Ph.D. in Electrical Engineering	1998
	<b>University of Washington</b> , Seattle, Washington, USA. M.Sc. in Electrical Engineering	1995
	<b>Portland State University</b> , Portland, Oregon, USA. B.Sc. in Electrical Engineering	1993
Proposals	PI: ROSES 2015 – <i>Science Utilization of the Soil Moisture Active-Passive Mission</i> Co-I: ROSES 2013 – <i>Terra and Aqua – Algorithms – Existing Data Products</i> PI: SMAP 2011 – <i>L1C Radiometer Data Product</i> Co-I: SMAP 2011 – <i>L2 &amp; 3 Passive Soil Moisture Data Products</i> Co-I: ROSES 2010 – <i>Evaluation &amp; Improvement of the Aqua/AMSR-E Soil Moisture Algorithm</i> Co-I: ROSES 2006 – <i>Variability and Trends in Land Surface Moisture and Emissivity Using Multisensor Passive Microwave Observations</i>	
Awards	The Federal Laboratory Consortium (FLC) Interagency Partnership Award	2016
	JPL Los Angeles Deformation Visualization Team Award	2015
Experience	Jet Propulsion Laboratory, Pasadena, California, USA. <i>Scientist</i> Explore new retrieval methods in microwave remote sensing of soil moisture and vegetation parameters, develop and maintain operational retrieval codes that produce satellite-based soil moisture products (AMSR-E [2002-2011], AMSR2 [2012-present], and SMAP [2015-present]) used by the worldwide research community, explore emerging super-resolution techniques to enhance satellite-based soil moisture datasets. <i>Caltech Postdoctoral Scholar</i> Developed the standard NASA Level 2 and 3 operational retrieval codes for the NASA's EOS Advanced Microwave Scanning Radiometer (AMSR-E) Soil Moisture Data Product. Conducted simulations to access the impacts of topographical layover and shadowing on elevation estimation accuracy for the STS-99 Shuttle Radar Topography Mission (SRTM).  <b>University of Washington</b> , Seattle, Washington, USA. <i>Research Associate</i> Taught courses on electromagnetic wave propagation in random media and antenna theory.	2001 - present 1999 - 2000 1998 - 1999

	Conducted research on detection of concealed objects using confocal microwave imaging and angular correlation function (ACF).	
<b>Affiliations</b>	<b>Senior Member, Institute of Electrical and Electronics Engineers</b>	2003 - present
	<b>Member, IEEE Geoscience and Remote Sensing Society</b>	2001 - present
	<b>Member, American Geophysical Union</b>	2002 - present
<b>Publications</b>	<b>Book chapter</b>	
	Nghiem, S. V., D. B. Wardlow, D. Allured, M. D. Svoboda, D. LeComte, M. Rosencrans, S. K. <b>Chan</b> , and G. Neumann (2012), "Microwave Remote Sensing of Soil Moisture – Science and Applications," Chap. 9, Part III, 197-226, in <i>Remote Sensing of Drought – Innovative Monitoring Approaches, Drought and Water Crises Book Series</i> , Taylor and Francis, ISBN 978-1-4398-3557-9.	
	<b>Peer-reviewed journal papers</b>	
	<b>Chan</b> , S., R. Bindlish, P. O'Neill, E. Njoku, T. Jackson, A. Colliander, F. Chen, M. Mariko, S. Dunbar, J. Piepmeier, S. Yueh, D. Entekhabi, M. Cosh, T. Caldwell, J. Walker, X. Wu, A. Berg, T. Rowlandson, A. Pacheco, H. McNairn, M. Thibeault, J. Martinez-Fernandez, A. Gonzalez-Zamora, M. Seyfried, D. Bosch, P. Starks, D. Goodrich, J. Prueger, M. Palecki, E. Small, M. Zreda, J. Calvet, W. Crow, Y. Kerr (2016): Assessment of the SMAP passive soil moisture product, <i>IEEE Transactions on Geoscience and Remote Sensing</i> , in press.	
	F. Chen, W. T. Crow, A. Colliander, M. Cosh, T. J. Jackson, R. Bindlish, R. Reichle, S. <b>Chan</b> , D. Bosch, P. Starks, D. Goodrich, M. Seyfried (2016): Application of triple collocation in ground-based validation of Soil Moisture Active/Passive (SMAP) Level 2 Data Products, <i>IEEE Transactions on Geoscience and Remote Sensing</i> , in press.	
	Konings, A. G., M. Piles, K. Rötzer, K. A. McColl, S. <b>Chan</b> , D. Entekhabi (2015): Vegetation optical depth and scattering albedo retrieval using time series of dual-polarized L-band radiometer observations, <i>Remote Sensing of Environment</i> , <b>172</b> , 178-189.	
	Mladenova, I., T. Jackson, E. Njoku, R. Bindlish, S. <b>Chan</b> , M. Cosh, T. Holmes, R. de Jeu, L. Jones, J. Kimball, S. Paloscia, E. Santi (2014): Remote monitoring of soil moisture using passive microwave-based techniques — Theoretical basis and overview of selected algorithms for AMSR-E, <i>Remote Sensing of Environment</i> , <b>144</b> , 197-213.	
	Das, N, A. Colliander, S. <b>Chan</b> , E. Njoku, L. Li (2014): Intercomparison of Brightness Temperature Observations Over Land from AMSR-E and WindSat, <i>IEEE Transactions on Geoscience and Remote Sensing</i> , <b>52</b> (1), 452-464.	
	Colliander, A., S. <b>Chan</b> , S. Kim, N. Das, S. Yueh, M. Cosh, R. Bindlish, T. Jackson, and E. Njoku (2012): Long-term Analysis of PALS Soil Moisture Campaign Measurements for Global Soil Moisture Algorithm Development, <i>Remote Sensing of Environment</i> , <b>121</b> , 309-322.	
	Ao, C. O., D. Waliser, S. <b>Chan</b> , J. Li, B. Tian, F. Xie, A. J. Mannucci (2012): Planetary Boundary Layer Heights from GPS Radio Occultation Refractivity and Humidity Profiles, <i>Journal of Geophysical Research: Atmospheres</i> , <b>117</b> (D16)	
	Konings, A. G., D. Entekhabi, S. <b>Chan</b> , E. G. Njoku (2011): Effect of Radiative Transfer Uncertainty on L-Band Radiometric Soil Moisture Retrieval, <i>IEEE Transactions on Geoscience and Remote Sensing</i> , <b>49</b> (7), 2686-2698.	

	<p>Jones, L. A., C. R. Ferguson, J. S. Kimball, K. Zhang, S. <b>Chan</b>, K. C. McDonald, E. G. Njoku, E. F. Wood (2010): Daily Land Surface Air Temperature Retrieval From AMSR-E: Comparison with AIRS/AMSR, <i>IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (J-STARS)</i>, <b>3</b>(1), 111-123.</p> <p>Jones, L. A., J. S. Kimball, K. C. McDonald, S. K. <b>Chan</b>, E. G. Njoku, and W. C. Oechel (2007): Satellite Microwave Remote Sensing of Boreal and Arctic Soil Temperatures from AMSR-E, <i>IEEE Transactions on Geoscience and Remote Sensing</i>, <b>45</b>(7), 2004-2018.</p> <p>Njoku, E. G., S. K. <b>Chan</b> (2006): Vegetation and surface roughness effects on AMSR-E land observations, <i>Remote Sensing of Environment</i> <b>100</b>(2): 190-199.</p> <p>Njoku, E., P. Ashcroft, S. K. <b>Chan</b>, and L. Li (2005): Global Survey and Statistics of Radio-Frequency Interference in AMSR-E Land Observations, <i>IEEE Transactions on Geoscience and Remote Sensing</i>, <b>43</b>(5), 938-947.</p> <p>Crow, W., S. K. <b>Chan</b>, D. Entekhabi, P. Houser, A. Hsu, T. Jackson, E. Njoku, P. O'Neill, J. Shi, and X. Zhan (2005): An observing system simulation experiment for Hydros radiometer-only soil moisture products, <i>IEEE Transactions on Geoscience and Remote Sensing</i>, <b>43</b>(6), 1289-1303.</p> <p>Njoku, E., S. K. <b>Chan</b>, W. Crosson, and A. Limaye (2004): Evaluation of the AMSR-E data calibration over land, <i>Italian Journal of Remote Sensing</i>, <b>30</b>(31), 19-37.</p> <p>Njoku, E., T. Jackson, V. Lakshmi, S. K. <b>Chan</b>, and S. V. Nghiem (2003): Soil Moisture Retrieval from AMSR-E, <i>IEEE Transactions on Geoscience and Remote Sensing</i>, <b>41</b>(2), 215-229.</p> <p><b>Chan</b>, S. K., Y. Kuga, and A. Ishimaru (1999): Experimental studies on circular SAR imaging in clutter using angular correlation function technique, <i>IEEE Transactions on Geoscience and Remote Sensing</i>, <b>37</b>(5): 2192-2197.</p> <p>Ishimaru, A., S. K. <b>Chan</b>, and Y. Kuga (1998): An imaging technique using confocal circular synthetic aperture radar, <i>IEEE Transactions on Geoscience and Remote Sensing</i>, <b>36</b>(5): 1524-1530.</p> <p><b>Chan</b>, S. K., Y. Kuga, and A. Ishimaru (1997): Subsurface detection of a buried object using angular correlation function measurement, <i>Waves In Random Media</i> <b>7</b>(3): 457-465.</p> <p><b>Chan</b>, S. K., Y. Kuga, and A. Ishimaru (1996): Angular memory effect of millimeter-wave scattering from two-dimensional conducting random rough surfaces, <i>Radio Science</i>, <b>31</b>(5): 1067-1076.</p> <p>Ishimaru, A., C. Le, Y. Kuga, L. A. Sengers, and S. K. <b>Chan</b> (1996): Polarimetric scattering theory for high slope rough surface - Summary, <i>Journal of Electromagnetic Waves and Applications</i>, <b>10</b>(4): 489-491.</p>
	<p><b>Conference papers</b></p> <p><b>Chan</b>, S. (2016): An Alternate Dual Channel Algorithm for Passive Soil Moisture Retrieval for the Soil Moisture Active Passive (SMAP) Mission: <i>Progress In Electromagnetics Research Symposium (PIERS)</i>, August 2016, Shanghai, China.</p> <p>Ruzbeh, A., S. <b>Chan</b>, N. Das, S. Kim, D. Entekhabi, M. Moghaddam (2016): A Multi-objective Optimization Approach to Combined Radar-Radiometer Soil Moisture Estimation, <i>Proc. 2016 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2016)</i>, July 2016,</p>

	<p>Beijing, China.</p> <p>O'Neill, P., S. <b>Chan</b>, A. Colliander, S. Dunbar, E. Njoku, R. Bindlish, F. Chen, T. Jackson, M. Burgin, J. Piepmeier, S. Yueh, D. Entekhabi, M. Cosh, T. Caldwell, J. Walker, X. Wu, A. Berg, T. Rowlandson, A. Pacheco, H. McNairn, M. Thibeault, J. Martínez-Fernández, Á. González-Zamora, M. Seyfried, D. Bosch, P. Starks, D. Goodrich, J. Prueger, M. Palecki, E. Small, M. Zreda, J-C. Calvet, W. Crow, and Y. Kerr (2016): Evaluation of the Validated Soil Moisture Product from the SMAP Radiometer: <i>Proc. 2016 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2016)</i>, July 2016, Beijing, China.</p> <p>Bindlish R., T. Jackson, M. Cosh, S. Milak, E. Njoku, S. Chan, M. Burgin, T. Caldwell, A. Berg, H. McNairn, J. Walker, Y. Zeng, Z. Su, M. Thibeault, J. Martinez (2016): Development and Validation of the GCOM-W AMSR Soil Moisture Product: <i>Proc. 2016 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2016)</i>, July 2016, Beijing, China.</p> <p><b>Chan</b>, S., E. Njoku, R. Bindlish, P. O'Neill, T. Jackson (2016): Forward Model Calibration For SMAP Passive Soil Moisture Retrieval Using Satellite Overpass Accumulation of Observations: <i>The 14th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment (MicroRad)</i>, April 2016, Espoo, Finland.</p> <p><b>Chan</b>, S., R. Bindlish, P. O'Neill, E. Njoku, T. Jackson, A. Colliander, F. Chen (2016): Post-Beta Status of the SMAP Level-2 Passive Soil Moisture Product: <i>USNC-URSI National Radio Science Meeting</i>, January 2016, Boulder, Colorado.</p> <p><b>Chan</b>, S., R. Bindlish, A. Colliander, F. Chen, P. O'Neill, T. J. Jackson, E. Njoku, A. Berg, T. Rowlandson, K. Taylor, M. Cosh, H. al Jassar, E. Lopez-Baeza, J. Martínez-Fernández, A. González-Zamora, H. McNairn, A. Pacheco, M. Moghaddam, C. Montzka, C. Notarnicola, G. Niedrist, T. Pellarin, J. Pulliainen, K. Rautiainen, J. Ramos, M. Seyfried, B. Su, Y. Zeng, R. van der Velde, M. Thibeault, W. Dorigo, M. Vreugdenhil, J. Walker, X. Wu, J. Asanuma, L. Dang, L. Pashaian, M. Spencer, D. Entekhabi, S. Yueh (2016): An Intercomparison of SMAP Passive Soil Moisture Retrieval Algorithms: The 96<sup>th</sup> AMS Annual Meeting, January, 2016, New Orleans, Louisiana.</p> <p>Bindlish, R., S. <b>Chan</b>, P. O'Neill, T. Jackson, E. Njoku, A. Colliander, M. Cosh, F. Chen, W. Crow (2015): Development and Initial Assessment of the SMAP Passive Soil Moisture Product: <i>AGU Fall Meeting</i>, December 2015, San Francisco, California.</p> <p><b>Chan</b>, S., E. Njoku, M. Burgin (2015): Retrieval of Geophysical Parameters and Model Coefficients Using X-band Emissivity Observations by Aqua/AMSR-E: <i>Progress In Electromagnetics Research Symposium (PIERS)</i>, July 2015, Prague, Czech Republic.</p> <p>Burgin, M., A. Colliander, E. Njoku, S. <b>Chan</b>, N. Das, S. Kim, F. Cabot, Y. Kerr, R. Bindlish, T. Jackson (2015): Intercomparison of SMAP L2/L3 Soil Moisture with Synergistic Satellite Products: First Results and Evaluation: <i>GEWEX Earth Observation for Water Cycle Science Conference</i>, October 2015, Frascati, Italy.</p> <p>Njoku, E., M. Burgin, S. <b>Chan</b> (2015): Evaluation of Theory and Observations for AMSR Retrieval of Soil Moisture and Vegetation Characteristics over Land: <i>URSI Atlantic Radio Science Conference</i>, May 2015, Gran Canaria, Canary Island.</p> <p><b>Chan</b>, S., R. Bindlish, E. Njoku, P. O'Neill, T. Jackson (2014): SMAP Global Model Calibration Using SMOS Time-Series Observations: <i>AGU Fall Meeting</i>, December 2014, San Francisco, California.</p> <p><b>Chan</b>, S., R. Bindlish, E. Njoku, P. O'Neill, T. Jackson (2014): SMAP Global Model Calibration Using</p>
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	<p>SMOS Multi-angle Time-series Observations: <i>The 13th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment (MicroRad)</i>, March 2014, Pasadena, California.</p> <p>Mladenova, I., T. Jackson, E. Njoku, R. Bindlish, S. <b>Chan</b>, M. Cosh, T. Holmes, R. de Jeu, L. Jones, J. Kimball, S. Paloscia, E. Santi (<b>2014</b>): Overview and Inter-comparison of Selected Global Soil Moisture Retrieval Approaches that Utilize Passive-based Observations: <i>The 13th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment (MicroRad)</i>, March 2014, Pasadena, California.</p> <p>Mladenova, I., T. Jackson, R. Bindlish, E. Njoku, S. <b>Chan</b>, M. Cosh (<b>2012</b>): Operational Soil Moisture Retrieval Techniques: Theoretical Comparisons in the Context of Improving the NASA Standard Approach: <i>AGU Fall Meeting</i>, December 2012, San Francisco, California.</p> <p>Njoku, E., D. Entekhabi, P. O'Neill, T. Jackson, R. Bindlish, S. <b>Chan</b>, A. Colliander, N. Das, S. Dunbar, S. Kim, J. Kimball, K. McDonald, M. Moghaddam, R. Reichle (<b>2012</b>): The Soil Moisture Active Passive Mission: Geophysical Products and Algorithm Development: <i>AGU Fall Meeting</i>, December 2012, San Francisco, California.</p> <p>Bindlish, R., T. Jackson, T. Zhao, M. Cosh, S. <b>Chan</b>, P. O'Neill, E. Njoku, A. Colliander, Y. Kerr (<b>2012</b>): Development of the SMAP Radiometer Soil Moisture Algorithm Using SMOS Data: <i>AGU Fall Meeting</i>, December 2012, San Francisco, California.</p> <p>Zhan, X., J. Liu, T. Holmes, W. Crow, T. Jackson, and S. <b>Chan</b> (<b>2011</b>): Why Different Passive Microwave Algorithms Give Different Soil Moisture Retrievals, <i>Proc. 2011 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2011)</i>, July 24-29, 2010, Vancouver, Canada.</p> <p>Bindlish, R., T. Jackson, T. Zhao, M. Cosh, S. <b>Chan</b>, P. O'Neill, E. Njoku, A. Colliander, Y. Kerr, J. C. Shi (<b>2011</b>): Evaluation of SMAP Level 2 Soil Moisture Algorithms Using SMOS Data, <i>Proc. 2011 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2011)</i>, July 24-29, 2011, Vancouver, Canada.</p> <p><b>Chan</b>, S. K., E. Njoku, and R. Dunbar (<b>2010</b>): Forward Simulation of Passive Microwave Observation for the Soil Moisture Active Passive (SMAP), <i>Proc. 2010 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2010)</i>, July 25-30, 2010, Honolulu, Hawaii.</p> <p>Colliander, A., S. <b>Chan</b>, S. Yueh, M. Cosh, R. Bindlish, T. Jackson, and E. Njoku (<b>2010</b>): Utilization of Airborne and In Situ Data Obtained in SGP99, SMEX02, CLASIC and SMAPVEX08 Field Campaigns for SMAP Soil Moisture Algorithm Development and Validation, <i>11th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environments</i>, March 1-4, 2010, Washington, DC, USA.</p> <p>Zhan, X., J. Liu, T. Holmes, T. Jackson, S. <b>Chan</b> (<b>2010</b>): An Analysis on the Single- and Multi-channel Soil Moisture Retrievals Algorithms for Passive Microwave Sensors, <i>Remote Sensing and Hydrology Symposium</i>, Sept 27-30, Jackson Hole, WY.</p> <p><b>Chan</b>, S. and E. Njoku (<b>2010</b>): Soil Moisture Variability from 8 Years of AMSR-E Data, <i>Joint AMSR Science Team Meeting</i>, June 2-3, 2010, Huntsville, Alabama.</p> <p><b>Chan</b>, S. K., R. Dunbar, A. Colliander, E. Njoku (<b>2009</b>): Algorithm Development Using the SMAP Algorithm Testbed, <i>Proc. 2009 IEEE International Geoscience and Remote Sensing Symposium</i></p>
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(*IGARSS 2010*), July 12-17, 2009, Cape Town, South Africa.

**Chan, S. K. and E. Njoku (2009)**: Retrieval Algorithm Development Based On SMEX02 Field Campaign Data For The Soil Moisture Active And Passive (SMAP) Mission, *Progress in Electromagnetics Research Symposium (PIERS)*, March 13-17, 2009, Beijing, China.

**Chan, S. K., E. Njoku, A. Konings, and D. Entekhabi (2008)**: The SMAP Algorithm Development Testbed: A Simulation Environment For Algorithm Development And Mission Design Studies, *AGU Fall Meeting*, December 2008, San Francisco, California.

Jin, K-W., E. Njoku, S. K. **Chan (2006)**: Impact of Rainfall on the Retrieval of Soil Moisture using AMSR-E data, *Proc. 2006 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2006)*, July 31-Aug 4, 2006, Denver, Colorado.

Njoku, E., S. K. **Chan**, R. L. Armstrong, M. J. Brodzik, M. H. Savoie, and K. Knowles (2006): Stable Targets for Spaceborne Microwave Radiometer, *9th Specialist Meeting on Microwave Radiometry and Remote Sensing Applications*, February 28 – March 3, 2006, San Juan, Puerto Rico.

**Chan, S. K. and E. G. Njoku (2005)**: Calibration Corrections for Studying Land Hydrological Climate Trends Using Passive Microwave Satellite Observations, *AGU Fall Meeting*, December 2005, San Francisco, California.

Crow, W., S. K. **Chan**, D. Entekhabi, A. Hsu, T. Jackson, E. Njoku, P. O'Neill, and J. Shi (2005): An observing system simulation experiment for Hydros radiometer-only soil moisture and freeze-thaw products, *IEEE Geoscience and Remote Sensing Symposium (IGARSS 2005)*, July 25-29, 2005, Seoul, Korea.

Njoku, E. and S. K. **Chan (2004)**: Soil moisture retrieval and algorithm evaluation for Aqua/AMSR-E, *8th Specialist Meeting on Microwave Radiometry and Remote Sensing Applications*, February 24-27, 2004, Rome, Italy.

Njoku, E., L. Li, S. K. **Chan**, P. Ashcroft, and F. Wentz (2004): AMSR-E observed radio frequency interference and implications for passive microwave remote sensing, *8th Specialist Meeting on Microwave Radiometry and Remote Sensing Applications*, February 24-27, 2004, Rome, Italy.

Khalsa, S., E. Njoku, S. K. **Chan (2004)**: Passive microwave retrievals of soil moisture over the Tibetan Plateau, *SPIE 4th International Symposium on Remote Sensing of the Atmosphere, Ocean, Environment, and Space*, November 8-12, 2004, Honolulu, Hawaii.

O'Neill, P., E. Njoku, S. K. **Chan**, W. Crow, A. Hsu, and J. Shi (2004): Comparison of Soil Moisture Retrieval Algorithms Using Simulated HYDROS Brightness Temperatures, *Proc. 2004 IEEE Geoscience and Remote Sensing Symposium (IGARSS 2004)*, September 20-24, 2004, Anchorage, Alaska.

**Chan, S. K. and E. Njoku (2003)**: Algorithm refinement for Aqua/AMSR-E soil moisture retrieval, *AGU Fall Meeting*, December 2003, San Francisco, California.

Njoku, E., S. K. **Chan**, W. Crow, D. Entekhabi, P. Houser, A. Hsu, T. Jackson, P. O'Neill, J. Shi, and X. Zhan (2003): An observing system simulation experiment for Hydros soil moisture retrievals, *AGU Fall Meeting*, December 2003, San Francisco, California.

Njoku, E., S. K. **Chan**, L. Li, S. Nghiem, T. Jackson, and V. Lakshmi (2003): Aqua AMSR-E

observations of land surface moisture variability, *Proc. 2003 IEEE Geoscience and Remote Sensing Symposium (IGARSS 2003)*, July 21-25, 2003, Toulouse, France.

Njoku, E., S. K. **Chan**, and S. Nghiem (2002): Use of Aqua/AMSR-E and synergistic microwave data to study soil moisture variability from space, *AGU Fall Meeting*, December 2002, San Francisco, California.

Nghiem, S., E. Njoku, J. van Zyl, Y. Kim, G. Neumann, and S. K. **Chan** (2002): Large-scale remote sensing of soil moisture using active and passive satellite data, *Proc. 2002 IEEE Geoscience and Remote Sensing Symposium (IGARSS 2002)*, July 24-28, 2002, Toronto, Canada.

Njoku, E. and S. K. **Chan** (2001): Land parameter estimation using satellite microwave radiometry: Retrieval issues, *AGU Spring Meeting*, 2001.

Njoku, E., L. Li, and S. K. **Chan** (2000): Retrieving soil moisture from spaceborne passive microwave data, *Proc. 2000 IEEE Geoscience and Remote Sensing Symposium (IGARSS 2000)*, July 24-28, 2000, Honolulu, Hawaii.